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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/730,430
Filing Date: December 08, 2003
Appellant(s): FULLINGTON ET AL.

Keith M. Baxter
<u>For Appellant</u>

EXAMINER'S ANSWER

This is in response to the appeal brief filed 1/07/2009 appealing from the Office action mailed 9/25/2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

US 6,573,681	SCHWESIG	6-2003

US 5,904,666	DEDECKER	5-1999
US 5,806,440	ROWLETTE	9-1998
US 6,775,115	SATO	8-2004
US 5,764,024	WILSON	6-1998

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 3, 7, 8, 9, 11, 15, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schwesig (US 6,573,681) in view of DeDecker et al. (US 5,904,666). Regarding Claim 1, Schwesig discloses a drive circuit (Figures 1,2) for delivering high- level power to a load M, the drive circuit comprising: a high power circuit W including a set of semiconductor switching devices T1-T6 capable of being coupled to the load and delivering the high level power thereto; a logic circuit ST generating signals to control the semiconductor devices; a low power circuit (A excluding S1, S2, logic circuit ST, I1, and 12) to transmit the signal from the logic circuit to the high power circuit, only when the low power circuit is receiving electrical power; and a safety S1, S2 to control the application

of power to the low power circuit (see different circuit portion of A in Figures 1,2, Column 1, lines 7-11, Column 3, lines 49-67, Column 5, lines 6-11).

Schwesig is silent regarding the safety circuit being electrically independent of the logic circuit. DeDecker teaches a safety circuit electrically independent (see secondary watchdog circuit disclosed in Column 10, lines 51-58) of a logic circuit 2.4 (see microprocessor 24 in Figure 4). It would have been obvious to those skilled in the art at the time the invention was made to modify the safety circuit of Schwesig and provide the safety circuit electrically independent of the microprocessor as taught by DeDecker, to shutdown the motor in case of microprocessor malfunction and thus to provide redundant protection to ensure power is removed from the motor (DeDecker, Column 10, lines 54-55).

Regarding Claim 3, Schwesig discloses the drive circuit, wherein the safety circuit is a safety relay that is coupled to a power terminal of the low power circuit, and wherein the safety relay decouples the power terminal of the low power circuit from a power supply in order to disable the low power circuit (Column 4, lines 35-44).

Regarding Claim 7, Schwesig discloses the drive circuit, wherein the safety circuit is coupled to an override port of the low power circuit, and wherein the safety circuit portion disables the low power circuit by providing a first signal to the override port of the low power circuit (see port/terminal to which SVl_Diag signal and SV2_Diag signal are connected in Figures 1 and 2).

Regarding Claim 8, Schwesig discloses the drive circuit, wherein the safety relay includes a hardware switch (S1, S2 are mechanical or electronic switches) that is capable of being switched between first and second states, and wherein when the switch is switched in the first state, the second circuit provides the first signal to the override port of the first circuit (Column 4, lines 23-35).

Regarding Claim 9, Schwesig discloses the safety circuit except the reference does not show a NOR gate as recited. It is known in the art that an art recognized equivalent circuit can be provided which alternatively provides a NOR gate.

Regarding Claim 11, Schwesig discloses the drive circuit, wherein the low power circuit includes an inverter circuit N1, N2, and a buffer circuit L1-L4 (Column 3, lines 58- 63, Column 5, lines 12-29).

Regarding Claim 15, Schwesig discloses the drive circuit, wherein the high power circuit includes a plurality of high power transistor devices T1-T6 that are light-actuated and a plurality of photodiodes (see photodiodes in OK1-OK6) receive the at least one control signal from the lower power circuit, and wherein the high power transistor devices are electrically isolated from the photodiodes (Column 3, lines 52-55, 66-67).

Regarding Claim 24, Schwesig discloses a motor drive circuit (Figures 1, 2) for delivering high-level power to a load M, the drive circuit comprising: a high power circuit W including a set of semiconductor switching devices T1-T6 capable of being coupled to the load and delivering the high level power thereto; a logic circuit ST generating signals to control the semiconductor devices; a low

power circuit (A excluding S1, S2, logic circuit ST, I1, and 12) to transmit the signal from the logic circuit to the high power circuit, only when the low power circuit is receiving electrical power; and a set of ports exposed by the drive allowing connection of a safety circuit to control the application of power to the low power circuit (see different circuit portion of A in Figures 1,2 showing the connection ports or terminals to which SV1-Diag signal and SV2-Diag signal respectively are connected, and S1, S2 provide signals to the ports, Column 1, lines 7-11, Column 3, lines 49-67, Column 5, lines 6-11).

Schwesig is silent regarding the safety circuit being electrically independent of the logic circuit. DeDecker teaches a safety circuit electrically independent (see secondary watchdog circuit disclosed in Column 10, lines 51-58) of a logic circuit 24 (see microprocessor 24 in Figure 4). It would have been obvious to those skilled in the art at the time the invention was made to modify the safety circuit of Schwesig and provide the safety circuit electrically independent of the logic circuit as taught by DeDecker, to shutdown the motor in case of logic circuit malfunction, and thus to provide redundant protection to ensure power is removed from the motor (DeDecker, Column 10, lines 54-55).

Claims 4, 6, and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schwesig (US 6,573,681) in view of DeDecker et al. (US 5,904,666) and Rowlette (US 5,806,440). Claim 4 differs from Claim 3 only in that the safety circuit is coupled to a pull-up resistor of the first circuit portion instead of power terminal of the first circuit. Schwesig or DeDecker does not disclose a pull-up resistor of the first circuit. Rowlette discloses a pull-up resistor R23

(Figure 2c) coupled to the safety relay K4 (Column 6, lines 55-65). It would have been obvious to those skilled in the art at the time the invention was made to modify the combination of Schwesig and DeDecker and to include a pull-up resistor as taught by Rowlette, because pull-up resistors are used in the art to provide a default logic HIGH for additional safety of the circuitry.

Regarding Claim 6, Rowlette discloses the safety relay with normally-open contact, and normally- closed contact, wherein the contacts are physically coupled (see relays K1, K2 in Figure 2c, Column 9, lines 30-35). Rowlette's relay is used in a heating device (furnace), but would necessarily perform the recited function of Claim 6, when configured as above.

Regarding Claim 13, Schwesig discloses an inverter circuit coupled to the buffer circuit (see N1, V1 and N2, V2 in Figures 1,2). The remaining part of Claim 13 recites the configuration including the pull-up resistor and safety relay recited in Claim 4, and the inverter. Claim 14 adds the limitation of an additional pull-up resistor in the configuration recited in Claim 13, further including the third circuit portion. It would be obvious to provide an additional pull-up resistor that is coupled to the third circuit, because the pull-up resistor can act as a load and keep the output at logic HIGH for additional safety of the circuit.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schwesig (US 6,573,681) in view of DeDecker et al. (US 5,904,666) and Sato (US 6,775,115). Regarding Claim 10, Schwesig or DeDecker does not disclose at least one coil that outputs a signal indicative of a current delivered by the high power circuit to the load, and wherein a determination is made regarding whether

the signal indicative of the current is proper when the switch is switched in the first state. Sato discloses drive circuit for a motor 16 (Figures 1 and 6), wherein a high power circuit 14 includes at least one coil 24a-c, that outputs a signal indicative of a current delivered by the high power circuit to the load, and wherein a determination is made regarding whether the Signal indicative of the current is proper when the switch is switched in the first state (Column 5, lines 28-54, Column 6, lines 63-65). It would have been obvious to those skilled in the art at the time the invention was made to modify the combination of Schwesig and DeDecker and to include a coil as a current sensor as taught by Sato for additional safety of the motor.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schwesig (US 6,573,681) in view of DeDecker et al. (US 5,904,666) and Wilson (US 5,764,024). Regarding Claim 12, Schwesig discloses the drive circuit, wherein when the low power circuit is not disabled, the logic circuit outputs a plurality of preliminary signals to the inverter circuit, the inverter circuit converts the plurality of preliminary signals into a Plurality of modified signals, and the buffer circuit provides the at least one control signal in response to the plurality of modified signals. Schwesig or DeDecker does not disclose that each of the preliminary signals, the modified signals, and the at least one control signal is a pulse width modulated (PWM) signal. Wilson discloses a plurality of signals G1, G2 which is pulse width modulated signal in a motor drive circuit 100 for a three phase motor U (Figure 3). It would have been obvious to those skilled in the art at the time the invention was made to modify the combination of Schwesig's and

DeDecker and to provide pulse width modulated signal as taught by Wilson, because pulse width modulation is used to control the speed and operation of the motor by modulating the pulse width of the signals.

(10) Response to Argument

Appellant's arguments regarding Claims 1, 6-8, and 24 have been fully considered.

The Appellant argues, on Page 10 of the Appeal Brief, that regarding Claim 1, that elements S1 and S2 of Schwesig does not teach a safety relay.

Examiner respectfully disagrees. The Appellant's arguments are pointed to a limited definition of safety relay having features making it suitable for safety circuitry meeting international standards and including particularly a "fault" contact that detects contact welds. The Appellant has not pointed what particular standard is met, and any particular structure of the safety relay is claimed. It is noted that patentability doesn't depend on the name of the relay.

Even assuming that the Appellant has pointed out the particular standards of a safety relay, the elements S1 and S2 of Schwesig's reference meet the limitations of a safety relay. In Column 4, lines 10-22, Schwesig discloses, "The function of "safe stopping" is implemented by turning off the power transistors T1 to T6 of the inverter W operationally or in the event of a fault. This is preferably performed by interrupting the supply voltage SV1, for the optocouplers OK1, OK3, and OK5 for the upper bridge arm of the power transistors via a switch S1 (**mechanical** or else electronic in design) with the aid signal I1 to IL1, and a further supply voltage SV2 for the optocoupler OK2, OK4, and OK6 for the lower

bridge arm via a switch S2 (**mechanical** or else electronic in design) with the aid of signal IL2 to the system I2".

In Column 1, lines 31-35, Schwesig discloses, "Here, the expression "safe" is intended to express that the respective requirements of any applicable professional associations and/or professional institutes for safety at work are being met."

Regarding the limitation of safety relay being "electrically isolated" from the logic circuit, the Appellant argues, on Page 11 of the Appeal Brief that the switches of S1, S2 of Schwesig reference are electrically connected and controlled by the logic circuit (microprocessors I1, I2) as can be seen in Fig. 1a.

In response, Examiner notes that the limitation of logic circuit is taught by element ST not by I1, I2, where ST can be subsystem arranged in the system I1 or external to I1, as taught in Column 3, lines 64-65, "ST can be a subsystem arranged in the system I1 or can take the form of a separate unit." The control signal to the switches from I1, I2 are not electrically dependent on logic unit ST as ST is separate from I1, I2. Schwesig also teaches, in Column 3, lines 60-64, "each system I1, I2 includes a controller such as a microprocessor, a microcontroller, an appropriate application specific integrated circuit ASIC or other control units known in the art." Schwesig's elements I1, I2 is not limited to a microprocessor as Appellant stated, but include any suitable control unit to control the switches S1, S2, i.e., control unit for mechanical switches or control unit for electronic switches as the switches S1, S2 can be mechanical or electronic in design.

Examiner also notes that though the claim recites the safety relay being electrically isolated, degree of isolation and the manner the isolation is attained and structure of the isolation is not claimed.

The Appellant argues, on Page 12 of the Appeal Brief, that regarding Claim 6, that there is no reason to believe that Rowlette is describing safety relays.

In response, Examiner notes that the safety relay is taught by the primary reference, Schwesig, not by Rowlette. Regarding Claim 6, Rowlette reference teaches a normally-open contact, and a normally- closed contact of a safety relay circuit, wherein the contacts are physically coupled as shown in relay contacts of K1, K2 in Figure 2c of Rowlette.

The Appellant argues, on Page 13 of the Appeal Brief, that regarding Claim 7, Schwesig reference does not teach an override port of the low power circuit.

In response, Examiner notes that claim does not recite any structure of the override port. The connection port or terminal of Schwesig to which the SV1_Diag signal, SV2_Diag signal connected to is the port through which safety relay S1, S2 is coupled to the low power circuit, and the safety relay portion disables the low power circuit by providing a first signal to the port (when S1, S2 open, no power is send to the override port and the low power circuit is disabled), and therefore, meets the limitation of an override port of the low power circuit.

It is also noted that SV1_Diag, SV2_Diag are not diodes as Appellant noted on Page 13 of the Appeal Brief, but are read back signals from the override

port to I1 and I2 indicating whether supply voltage SV1, SV2 are provided to the port (see Schwesig, Column 4, lines 27-31).

The Appellant argues, on Page 14 of the Appeal Brief, that regarding Claim 8, the switches S1, S2 of Schwesig do not connect to an override port; they control power to the power at the anodes of optoisolators.

In response, Examiner notes that claim does not recite any structure of the override port. The connection port or terminal of Schwesig to which the SV1_Diag signal, SV2_Diag signal connected to is the port to which contact or hardware switch portion of safety relay is connected (S1, S2 are mechanical or electronic in design and have hardware switch or contacts and relay coil) and the same port is connected to the low powered circuit also, and the safety relay portion disables the low power circuit by providing a first signal to the port (when S1, S2 open, no power is send to the override port and the low power circuit is disabled), and therefore, meets the limitation of an override port of the low power circuit.

Examiner further notes that optoisolators/optocouplers, OK1-OK6 are part of low power circuit which transmit signal from logic circuit ST to high power circuit, T1-T6 of W, and the optocoupler terminal is connected to the override port. The low power circuit transmits the signal it receives, does not control the application of power to itself, the safety relay having a contact connected to the low power circuit control the application of power to the low power circuit. Therefore, the anodes of the optocouplers or diode anodes are not identified to

teach override port or controlling power to the low power circuit, or "double counts" a single element as Appellant alleges on Page 14 of the Appeal Brief.

Regarding Appellant's arguments toward the limitation of "a safety relay" of Claim 24, please see the response to the arguments of "a safety relay" of Claim 1 above.

The Appellant argues, on Page 15 of the Appeal Brief, that regarding Claim 24, that it is apparent that electrical or mechanical switches S1, S2 of Schwesig are closely integrated with microprocessors I1, I2 of Schwesig and in fact driven directly by low voltage microprocessor signals.

Examiner respectfully disagrees. As discussed previously in response to Appellant's arguments toward Claim 1, the limitation of logic circuit is taught by element ST not by I1, I2, where ST can be subsystem arranged in the system I1 or external to I1, as taught in Column 3, lines 64-65, "ST can be a subsystem arranged in the system I1 or can take the form of a separate unit." The control signal to the switches from I1, I2 are not electrically dependent on logic unit ST as ST is separate from I1, I2. Schwesig also teaches, in Column 3, lines 60-64, "each system I1, I2 includes a controller such as a microprocessor, a microcontroller, an appropriate application specific integrated circuit ASIC or other control units known in the art." Schwesig's elements I1, I2 is not limited to a microprocessor as Appellant stated, but include any suitable control unit to control the switches S1, S2, i.e., control unit for mechanical switches or control unit for electronic switches as the switches S1, S2 can be mechanical or electronic in design.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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